

Before proceeding to prove this, let us make a few remarks upon the general system of examination. A great deal has been said and written against this system, as if examinations in themselves were rather to be avoided than otherwise. This, however, is surely a mistake. The University of London does not, in our opinion, err in respect of its examinations being excessive, but rather in respect of its examinations being incomplete. *A properly conducted examination system tests the power of the pupil for producing his knowledge when occasion requires.* If it be the case that the Jesuits excel in this art, so much the more credit to them, for the art of producing one's knowledge is something desirable, which ought certainly to be taught.

Now the fault we have to find with the University of London is that, at least in its junior examinations, it does not test the excellence of the manner in which a candidate produces his knowledge, and can hardly be expected to do so. The London examination is not led up to by previous class examinations, in which the knowledge-producing power of the various pupils is carefully tested and commented on. If the candidate passes in, let us say, the matriculation examination, he may get credit for the quantity of his knowledge, but none for the excellence of his method of producing it. If he fails to pass from want of this facility, nothing is said—he is simply told that his knowledge has proved insufficient. If his power of producing knowledge is to be rectified, it must be done at his college, and under the eye of his teacher, but if he has no college and no teacher, it will not be done at all. And yet the University of London, from its privilege of granting degrees, has very great power over the various provincial colleges, and not only tells them by means of its calendar what things they must teach, but also the manner in which these things are to be taught. True freedom of teaching is incompatible with this system, and unquestionably the teaching that would *pay best* in an institution absolutely bound to the University of London would be of a style prejudicial to all originality. Indeed it would be a mistake for such institutions to have at the head of their departments teachers of originality and power of research. Teaching of the kind to suit this system is incompatible with research.

But if the University of London be deficient in this respect, it is even more so in the other functions of a University. It can hardly be said to take any account of the moral, the social, or the physical training of its alumni. In fine it has the paramount power of granting degrees, but without any corresponding responsibility, for it leaves the most important parts of its graduate education to be done by other institutions, or even not to be done at all.

In this article we have endeavoured to show that an extension of the system of the present Universities is inadequate to the educational wants of the country. In a future article we shall discuss in what way these wants may, in our opinion, be most properly remedied.

THE DUTCH IN THE ARCTIC SEAS

The Dutch in the Arctic Seas. By Samuel Richard van Campen. Two vols. With Illustrations, Maps, and Appendix. Vol. I.—A Dutch Arctic Expedition and Route. (London: Trübner and Co., 1876.)

MR. VAN CAMPEN is a native of the United States, evidently of Dutch descent, and is enthusiastic on behalf of the past and future glory of his native country.

The two volumes, of which the first has just been published, have been written for the express purpose of inducing the Hollanders to reassume their place in the field of Arctic exploration, which as a nation they have deserted since the last voyage of the famous Barents, now nearly 300 years ago. The prominent position which the Netherlands once held as navigators and discoverers all the world over, is well known, and as seamen they still occupy as good a position as ever. Their addition to the list of, happily increasing, Arctic explorers would certainly be an acquisition; and we are glad to see that a movement has been commenced by the Dutch Society for the Promotion of Industry to induce the Government to enter into this matter in friendly rivalry and co-operation with other civilised countries. We hope the Society, backed by the arguments urged in Mr. van Campen's work, will be successful in their endeavours.

The work referred to—including the volume which is published and the one to come—is the expansion of two articles in the *Transatlantic Magazine*. The author endeavours to rouse the spirit of Hollanders by insisting on the glories which their nation achieved in the past, by pointing out how much yet remains to be done ere the Arctic problem be solved, by showing them what other nations are doing, and by pointing out that the Spitzbergen-Novaya-Zemlya route belongs to them by inheritance. Mr. van Campen rather boldly, but no doubt with considerable justice, compares the Dutch in the earlier days of their history to the Phœnicians, who in the pursuit of trade penetrated into the most distant parts of the earth, making many discoveries of which the record is lost. He brings our own country to the front as the "grand exemplar" in the matter of Arctic exploration, and shows that the motives which now actuate nations in the pursuit of this field of enterprise are nobler than those which led in the old days to the quest for a north-west or north-east passage. Mr. van Campen is strongly of opinion that the Dutch in these old days made many discoveries which have dropped out of sight, and that not improbably even the Franz-Josef Land of the Payer-Weyprecht Expedition was long ago discovered and some of its points named by the Dutch whalers who used to frequent these seas in great numbers. Dr. Petermann seems also to be of this opinion; and we are sure if the Dutch can make good their claim to any discoveries which have been renamed, everyone will rejoice to reimpose the old Dutch names.

Mr. van Campen urges many arguments in favour of Arctic Exploration, and especially in favour of its resumption by the Dutch. These arguments we need not recount here, as all our readers have been made familiar with them in connection with the expedition, which may by this time have found the secret of the Pole. The author devotes considerable space to a discussion, or rather a comparison of opinions, as to the nature of the unexplored region round the Pole. The map prefixed to this volume shows Dr. Petermann's continuation of Greenland right across to Kellet Land, somewhat N.W. from Behring Strait. We fear few geographers will agree with this conjectural Polar continent of Petermann; all that we know points to the likelihood of the undiscovered region being broken up into an archipelago. Mr. van Campen also devotes considerable space to the question of an open Polar

sea, a question which now seems to us out of date. We think, considering the object of his work, the author has made a mistake in filling up so much space with a comparison of opinions on these questions; he has done the same with the Gulf Stream and Ocean Current question, introducing large quotations from the well-known authors who have discussed it. We do not see that all this matter is quite relevant to the object for which the book has been published. The English readers, for whom the work must be meant, are already familiar with all that Mr. van Campen has brought forward, and so, we should think, are the Dutch readers who are likely to take an interest in the work. For both English and Dutch readers great compression would here have been advisable; and, indeed, we think the whole work might have been contained in one volume. All these conjectures as to the nature of the Polar region and the extent of the Gulf Stream seem to us waste of energy, as the only method of solution is to go and see. And this is what Mr. van Campen wants the Dutch to do. He also discusses the—to English readers, at least—somewhat threadbare question of routes, and with justice shows that the route for the Dutch is their old one by Spitzbergen or Novaya Zemlya. He thinks they might try either a route to the north-east by Novaya Zemlya somewhat on the traces of the Payer-Weyprecht expedition; or—and he seems to prefer this—they might make Spitzbergen a basis of operations, and with two ships establish a dépôt, and by taking plenty of time, might in this way, partly by ship partly by sledge-boat, reach the Pole. Happily, however, Mr. van Campen does not hold up the Pole as the only and chief goal of Arctic exploration; he shows forcibly and fully the many great gains to science and humanity which are to be obtained by a perfectly equipped Arctic expedition. It would, we think, be fortunate both for the Dutch and for science if they could be persuaded again to occupy the field on which of old they reaped so much glory; and now that there is every likelihood of an international system of stations being established around the Polar regions, we cannot see that so important, though so small a nation, can any longer withhold itself from doing its share of the world's work in this matter. No doubt the Dutch have for long had much to do in looking after the affairs of their own household, but now there are signs that they have leisure and wealth enough to take a substantial part in cosmopolitan work. Mr. van Campen's arguments have already been brought under the notice of several prominent Dutchmen, and we think his object would be better served by the publication of a compressed Dutch edition, than it seems likely to be by this lecture read to the nation in the hearing of the English. "As certainly as the North Pole exists it is necessary to our command of the forces of nature, in the interests of mankind, that we should know in what way the ice and snow, the long nights and day, the tides and the geological formation of lands and islands about that mysterious summit of the Polar axis, react upon more favourable and fully inhabited climes. The *Alert* and *Discovery* have gone forth, then, at the call of England only, not to serve England only, but the entire world. And not less important, we may add, would prove a Dutch Arctic expedition for the service of science and mankind."

For English readers who want, in short space, to get a knowledge of the arguments in favour of Arctic exploration, of the discussion on the subject of the various routes, of an "open Polar sea," and the configuration of the unknown region, and on the question of ocean currents and the Gulf Stream, Mr. van Campen's first volume will prove useful. The second volume will, however, possess for us more of novelty and interest, as it will contain a history of Dutch Arctic enterprise. As there are no cuts in this volume, we presume Volume II. will be well supplied with illustrations and maps. We hope soon to have it before us.

OUR BOOK SHELF

Proceedings of the London Mathematical Society. Vol. VI. (London: Messrs. Hodgson, 1876.)

PROF. CAYLEY contributes to this volume several memoirs bearing on the theory of attraction. References to some of his earlier papers on the subject are given in Todhunter's "History." The titles of the present papers are "On the Potentials of Polygons and Polyhedra," "On the Potentials of the Ellipse and the Circle," "Determination of the Attraction of an Ellipsoidal Shell on an Exterior Point," "Note on a Point in the Theory of Attraction." The order of the papers will indicate the direction of growth the subject took in the author's hands. Mehler has treated of the attraction of polyhedra, but Prof. Cayley's results "are exhibited under forms which are very different from his, and which give rise to further developments of the theory." He finds general formulæ for the potentials of a cone and a shell, he then takes the case of a polyhedron or a polygon, obtains results for rectangular pyramid, rectangle, and cuboid, and verifies some of these results. The attraction of an indefinitely thin ellipsoidal shell was shown by Poisson to be in the direction of the axis of the circumscribed cone, this property was also demonstrated geometrically by Steiner. The geometrical investigation was subsequently completed by Prof. Adams so as to obtain from it the finite expression for the attraction of the shell, a result which had also been obtained analytically by Poisson. Prof. Cayley states the geometrical theorems, proves them, and obtains analytical expressions for the attraction of the shell and for the resolved attractions. The law of attraction throughout is that of the inverse square. The same writer also contributes a paper "On the Expression of the Co-ordinates of a Point of a Quartic Curve as Functions of a Parameter." This last is the development of a process of Prof. Sylvester's. Dr. Hirst's remarks on "Correlation in Space" are a mere abstract of results, a fuller statement of which is reserved for a future communication. Prof. Wolstenholme contributes a neat piece of analysis called "A New View of the Porism of the In- and circum-scribed Triangle." Prof. Sylvester contributes two interesting notes from M. Mannheim with reference to Peaucellier's cells and their application. The Rev. W. H. Lavery supplies an "Extension of Peaucellier's Theorem." Mr. Routh has a paper "On Laplace's Three Particles, with a Supplement on the Stability of Steady Motion;" Mr. Samuel Roberts contributes a paper "On a Simplified Method of obtaining the Order of Algebraical Conditions." This method is illustrated by various geometrical applications. Further papers of an analytical character are "On the Solution of Linear Differential Equations in Series," Mr. J. Hammond; "Note on some Relations between Certain Elliptic and Hyperbolic Functions," Mr. J. Griffiths; "Notes on Laplace's Coefficients," Mr. J. W. L. Glaisher. In mixed mathematics we have papers "On the Application of Hamilton's Characteristic Function to the Theory of an Optical Instrument symmetrical